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USAWC MILITARY STUDIES PROGRAM PAPER

TRANSITIONING TO MSE IN THE DIVISION - WHAT CAN BE DONE NOW

AN INDIVIDUAL ESSAY

by

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16 April 1985

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## TRANSITIONING TO MSE IN THE DIVISION - WHAT CAN BE DONE NOW

### INTRODUCTION

The Army is embarking on one of the most ambitious procurement programs, in terms of effect on warfighting capability, since the introduction of the M-1 and the Bradley. This procurement, however, does not deal with a weapons system - at least in the traditional sense. The program, known as Mobile Subscriber Equipment (MSE), is a wholesale replacement of communications equipment and doctrine at corps and division level. At an estimated procurement cost of \$.5 B, it is certainly not the most expensive Army program. But it will have a dramatic effect on the combat effectiveness of our divisions and corps'.

The fielding concept for MSE calls for equipping a corps at a time, starting with III Corps at Fort Hood, Texas. This paper, however, will deal with the transition of MSE into our divisions. It is the area with which I am most familiar, having just come from division signal battalion command in Germany. Much of what I will cover, however, will have applicability to the corps.

It is important to understand that MSE is not simply a replacement for the communications equipment we are currently using in the tactical arena. To be sure, the transition would be complicated enough if this were the case. The fact is, however, that MSE will inherently and radically change the way communications are handled at division and corps. This change will not only be felt by the corps signal brigade and the division signal battalion. It will be felt across the corps and division because it will alter their ability to maneuver, use terrain, control subordinate elements and transfer and process information. Here I think a broad description of MSE is in order.

#### MSE - WHAT WILL IT DO?

There are three basic elements which comprise the MSE system. The Mobile subscriber Terminal (MST) is essentially a radiotelephone which will accomodate voice, data, facsimile or teletype traffic. The Mobile subscriber Central (MSC) will be the system controller for switching, radio relay and operator assistance for the network. It will interface with virtually all transmission means: cable, VHF radio and satellite. The MSCs will be the only element of the MSE system that requires occupation of prominent terrain.

It will, however, not be collocated with any divisional combat command post. Finally, the Access Unit (AU) will provide a fully automated capability for radio/wire integration and switching, to include telephone switching to distant switchboards. A more complete system description of the MSE system is provided at inclosure 1.

There are a number of significant advantages which MSE will provide over current division signal battalion capabilities. These advantages accrue in both personnel savings and operational enhancements. For the purposes of this paper I will only discuss those which effect the combat capability of the division. First, MSE will provide division and brigade commanders an unprecedented degree of mobility on the battlefield. Currently, in most divisions, signal battalion deployment, as described by technical equipment limitations and doctrine, limits the location of division and brigade command posts to about 1 to 2 km of a prominent terrain feature. TOE equipment distribution within the signal battalion and the line-of-sight limitation of our current equipment dictate the use of prominent terrain for the signal element supporting combat command posts. The tempo of combat dictates how far away the command post will be able to locate from the signal site. While there are other limitations, the key limiter is how much time the

tactical situation permits for the running of wire from the signal site to the command post. MSE will, to a great degree, eliminate terrain dependence for the division's combat commanders. This will be accomplished by locating the MSC switching nodes on prominent terrain, away from any combat command posts. These MSC nodes will automatically route calls from subscriber to subscriber regardless of whether the caller was in a fixed location or mobile on the battlefield. If mobile, the subscriber would use the MST. The principal here is the same as a mobile telephone system used in many big cities today. Current plans call for the division to be equipped with four MSC switching nodes and approximately 200 MST units. The capability for this type of freedom of action and mobility on the battlefield will be a tremendous combat multiplier.

Next, MSE will provide the Division Commander with an unprecedented degree of stability in his command and control system. Currently, every move of the Main, TAC, DIVARTY, DISCOM or Brigade command post means an unavoidable loss of communications with the moving unit. The duration of that loss depends on the tactical situation, terrain, as well as the amount of advanced warning provided to and the proficiency of the signal battalion. This latter element will also be effected by the number of tactically dictated

moves in a given amount of time; the greater the number of moves in a limited amount of time, the greater the loss of efficiency due to the physical limitations of the signal team. With MSE, however, a major relocation of signal equipment will only be required when an MSC node has to move. The frequency of these moves can be limited by careful planning on the part of the signal battalion based on close coordination with the division staff and a thorough understanding of the tactical situation. Even when the move of one MSC node is required, however, there will be three other nodes still in place to maintain continuity. Again, if the MSC nodes are carefully placed the move of one, or even perhaps two, should still permit virtually uninterrupted service. In any event, key personnel will have MSTs for mobile use.

Third, MSE will eliminate the current interface problem between the corps signal brigade and the division signal battalion. This is true because for the first time all signal battalions within the corps will be equipped with identical communications hardware. Thus, the corps will have the ability to weight the battle in a communications sense just as a division commander might weight the battle in favor of one brigade by cross-attaching units and/or providing priority of indirect fires. The corps signal

brigade will be able to do the same thing by placing more or less of its MSC nodes in a given division's sector. The more MSC nodes, the greater mobility and stability the supported combat units will realize. Since the equipment being used by the Corps and the division is identical, such placement will be transparent to the division user.

Finally, MSE will provide the signal officer with a greater capability to reduce battlefield electronic signatures. The deployment and equipment characteristics will, for all practical purposes, make division, brigade, DIVARTY, and DISCOM command posts look the same electronically. The propagation characteristics of the equipment to be associated with these command posts will also make electronic detection at any real distances very problematic. Additionally, careful placement of the MSC nodes to take maximum advantage of terrain while attempting to keep transmission paths between the MSC nodes parallel to the FLOT, will reduce the possibility of detection of the highest signature items in the system - the nodes. It is worth stressing here that unlike the situation existing in many divisions today, under MSE the division main command post no longer will be the biggest electronic signature in the division area.



As can be seen from even this brief overview of MSE, it represents an entirely new way of handling the communications business of a division. Apart from all of the equipment fielding and training issues, which to be sure are numerous and complex, there are also the doctrinal employment issues. Coupled with these of course is the problem of redirecting the thinking of key division and signal battalion personnel. It is this specific area of the transition to MSE that I want to examine.

#### SETTING THE OPERATIONAL STAGE FOR MSE

Is there anything that division signal battalions can do now to pave the way, in an operational sense, for MSE? How can key players in the signal battalion and in the division be prepared for such a radical change in the concept of providing tactical communications support? I believe that there are both organizational and educational steps that can be taken which will ensure a smooth transition to MSE. It is important to point out here that these organizational and educational steps must both be taken for the following proposal to work; one without the other is useless. I would like to state at the outset that the changes I am about to describe can be implemented with

or without a MTOE change. I understand that there is a current move toward formalizing some sort of MTOE change designed to do some of the things I will be presenting here. Whether or not that effort bears fruit, this is a concept which has been field tested in a division stationed in Germany. It was implemented without benefit of a MTOE change and it was tremendously successful. Now let us examine the organizational changes which could be made within the current signal battalion TOE personnel and equipment allowances.

#### \* REORGANIZING THE SIGNAL BATTALION

As previously stated there are four key enhancements, speaking operationally only, which MSE will bring to tactical communications. As identified these are mobility, stability, electronic signature reduction, and the elimination of communications interface problems between corps and division. The problem now is to reorganize the current signal battalion structure in such a way as to provide the division with as much benefit as possible from the MSE concept, given the fact that the signal battalion does not yet possess the state-of-the-art equipment designed to make that concept a reality. Obviously, there is no way to duplicate the key enhancements of MSE without the new

equipment. By restructuring the signal battalion, however, it is possible to replicate, albeit on a small scale, the philosophy behind MSE. Once this is accomplished, the transition from 1950's technology and doctrine to 1990's technology and doctrine will be infinitely easier.

The brain of the MSE concept is the MSC node. The key question is can such an operation be derived from current signal battalion assets; the answer is yes. For the record I must state here that my assessments during the development of this proposal are based on the current H series TOE for a European-based division signal battalion. A listing of major equipment items within such a signal battalion is provided at inclosure 2. While I believe that my conclusions are equally applicable to all signal battalions I do recognize the equipment differences that exist between European-based and other divisional signal battalions. Having answered the question of creating a MSC-type node in the affirmative, what is it specifically that can be done? First of all the amount and type of major communications equipment assemblages required to perform the functions of switching, radio relay and operator assistance must be determined. Once that is determined then the number of nodes to be fielded can be calculated. The number of nodes will be a function of what can be afforded in a

communications equipment sense and what is required based on an indepth analysis of the terrain in the particular division's GDP, as well as the division's operational concept for war. I would submit that in general terms an analysis of all these factors will result in affordable/required nodes numbering not less than two nor more than three. A two node configuration would require the following major items of equipment:

TRC-145	6 each
TRC-113	2 each*
TCC-65	2 each*
TTC-41	1 each
SB-611/675	1 each

\* Used in combination as a PCM Terminal

Once the equipment has been identified for the nodes then configurations suitable for the division command posts must be developed. Remember that with MSE each of the division's major command posts are made to look electronically similar. While exact configurations may differ somewhat based on the division's specific concept of operations and the the Jump Concept employed by the signal battalion a typical equipment distribution would look as follows:

Division Main

TRC-145	3 each
TTC-41	2 each
GRC-142	3 each

Division TAC

TRC-145	2 each
TTC-41	2 each
GRC-142	3 each

Brigade CPs

TRC-145	2 each
GRC-142	2 each
TTC-41	organic

Brigade FASTs

TRC-145	2 each
TTC-41	1 each
GRC-142	2 each

DIVARTY

TRC-145	2 each
---------	--------

DISCOM

TRC-145	2 each
TTC-41	1 each
GRC-142	6 each

The next question is how to organizationally handle the nodes within the signal battalion. There are several options here, of course. In the two node configuration the nodes are naturally somewhat larger than they would be if three nodes were required. Staying with the two node option I elected to place one node under the control of A Company and the other under the control of C company. This mission, in each case, was in addition to the current doctrinal roles

of these companies. A new platoon was created in each company for command and control of the nodes. In the case of A Company, the structure used was the Commcenter Platoon. This was a convenient choice since record traffic internal to the division was handled exclusively by use of facsimile; commcenters are used only from division to corps. In C Company a new platoon was created and existing platoons were changed as will be described later. This arrangement proved to be quite satisfactory from a command and control point of view and since we are dealing with only two nodes it left B Company capable of focusing entirely on support of the combat brigades. In broad terms the three line companies of the division signal battalion appeared as follows:

A Company

Main Platoon (Division Main CP)

TAC Platoon (Division TAC CP)

Node Platoon

B Company

1st Platoon (1st Brigade and FAST: now Forward Support Battalion)

2nd Platoon (2nd Brigade and FAST: now Forward Support Battalion)

3rd Platoon (3rd Brigade and FAST: now Forward Support Battalion)

C Company

Support Platoon (DISCOM)

Multichannel and Relay Platoon (Separate terminals  
and PCM relays)

Node Platoon

Of the task organization listed above, the Multichannel and Relay Platoon within C Company deserves some explanation. This platoon had the mission of supporting units such as DIVARTY, the Aviation Battalion and the CEWI Battalion. Although FM 11-50 spells out specific units of this type to be supported, in actuality each division handles this in a slightly different manner. The point is, however, that this function was placed in this platoon. Additionally, this platoon had responsibility for all of the unassigned TRC-113 PCM relays within the

battalion. This was an extremely critical mission given the terrain requirements for relays in Germany. The Multichannel and Relay Platoon had the mission of training the relay teams so that they could be employed individually. This was extremely difficult from both training and control viewpoints but it gave the battalion and hence the division great flexibility in maneuver. The above then is the organization which was used to provide for signal centers which functioned as major switching and relay points modelled after the MSC node concept. Decidedly not as efficient as MSE will be but very close in terms of operational concept.

If the MSC node is the brain of MSE then the Mobile Subscriber Terminal (MST) is its heart. It is the MST which really provides the quantum jump in mobility to the division, particularly the brigades. Is there anything that can be done within current equipment and personnel limitations to provide a little more mobility and flexibility to the division's combat brigades? Although considered unorthodox by many, I maintain there is something that can be done. I provided a TRC-113 PCM relay to each B Company platoon. That piece of equipment provided the B Company platoon leader with the organic capability of relaying one PCM shot for the brigade thus giving the



Brigade Commander the option of locating his command post someplace other than "signal hill". All of this, of course, must be done in coordination with and at the final direction of the signal battalion SYSCON. Again, this concept worked well in actual practice in Germany. Although it places something of a burden on the signal battalion the benefits in terms of support to the brigade is significant. I found that Brigade Commanders felt that for the very first time the signal battalion was actually providing support commensurate with their wartime needs. Perhaps a word is in order here on how command post jumps were handled since that topic is germane to the issue of wartime service. When a brigade CP (also applies to DIVARTY and the division TAC CP) moved the first circuit that went in on the jump PCM system was a long local off of one of the node switchboards. This provided very quick access into the entire division multichannel system. After practice, this circuit was always in prior to the arrival of key brigade CP personnel. For jumps of the division main CP a prepatched and programmed jump TTC-41 was used.

This was by no means a one way street, however. In order for the signal battalion to make the above restructuring work in terms of switching and trunking capability something had to give. That something was the

favorite of all combat commanders - the dedicated circuit. This brings us to the most difficult part of this concept for transitioning to MSE - education, or more precisely, re-education.

#### \* RE-EDUCATING THE PLAYERS

This process must start with the division. At the outset I must say that it would be foolhearty not to recognize that there are definite political considerations which must be taken into account. The Signal Battalion Commander must carefully formulate a strategy that acknowledges the political realities of his division. This is not to imply any conduct which less than totally honest. It is simply a statement of fact that the approach can be everything; it is critical that the key players in the division understand completely what is being proposed and that they support it. I would suggest the following approach which worked well for me. First, a concept briefing outlining the basics of the proposal be developed and presented to the Commanding General, the Chief of Staff, the Assistant Division Commander (Manuever) and the G-3. The audience may vary somewhat, again based on the politics and personalities of the given division, but the advice would be to keep the initial group small - only the real power

centers. The purpose of the briefing should be to gain approval in principal only. Concentrate on the broad benefits, e.g. mobility, stability, and reduced signature vulnerability. It should be made clear here, however, that in order for the nodes to function efficiently as switching centers that the communications system needs to become common user oriented. In my division, for example, dedicated circuits were eventually provided only between the G-3/S-3 and the FAST(FSB)/DISCOM. I would suggest avoiding the detail necessarily associated with restructuring the signal battalion. Again, the intent is never to deceive and you must be prepared to discuss that in as much detail as your audience demands. My belief is, nonetheless, that such a discussion at this point will only detract from the main issues. Once agreement is obtained two things must be done. First, the Signal Battalion Commander must take his briefing to the division's major subordinate commanders, i.e. brigade, DIVARTY, and DISCOM. Next, a detailed implementation program must be developed.

The major subordinate commanders must be made to feel apart of the system that is being developed and the decision process. The emphasis here, naturally, should be on what the restructured communications system will provide them in terms of enhanced warfighting capability. The issue

of dedicated circuits needs to be forthrightly addressed here. As a point of interest, in briefing the brigade commanders I learned that each one of them felt very strongly about the issue of PCM support for their FAST(FSB), something which had never been provided. Due to their voiced concerns the multichannel system was altered to include multichannel service to the FASTs. A multichannel diagram at inclosure 3 depicts how that was accomplished. As with the Division Commander, you are not looking here for an irrevocable commitment to the concept, simply agreement in principal. Now comes the implementation program.

The speed with which this can be approached will depend to a great extent on the number and scheduling of locked-in training events on the division's and Signal Battalion's calendars. Given relatively free calendars, I would suggest that a three month schedule culminating in a division FTX/CPX is the most optimistic one could reasonably develop. Without attaching dates to the events here are the key things which must be accomplished. First, key players within the signal battalion (down to platoon sergeant) and the signal officers of the division's major subordinate commands must be thoroughly briefed. This briefing must be technically detailed and address the entire system to include individual circuits. Individuals being briefed must

be encouraged to critically evaluate what they are being told. Issues raised which cannot be satisfactorily settled during the initial meeting must be recorded and tracked. A minimum of two of these give-and-take sessions will probably be required. Depending on the amount of homework done on the part of the signal battalion staff, the number could be significantly greater. Next I would suggest briefings and discussions of a similiar type with all concerned team chiefs. Finally, the Battalion Commander himself should, in broad terms, brief the entire battalion. A key element of this briefing needs to be the topic of inter-company personnel transfers which will be required to support the reorganization. The key players here, S-1, CSM and Executive Officer, should be instructed that these moves be kept to the absolute minimum required, that team integrity be disrupted only as a last resort, and that maximum use be made of incoming personnel. The Battalion Commander should relay this all to the battalion.

While the above is going on the Executive Officer should be tasked to develop a plan to accomplish necessary equipment redistribution. This plan must be developed with the close coordination and cooperation of the Company Commanders and their supply sergeants, the S-4 and the division PBO. I

will not dwell on this aspect here but its vital importance should not be minimized.

After the briefings/meetings have been conducted and the issues raised have been addressed, one way or another, the next step should be a series of classroom wargames. If carefully designed these games should show up heretofore unforeseen problems. All key players should be made to participate - playing themselves. Again, it is very important that division major subordinate command signal officers participate fully. As before, issues which are developed and cannot be immediately resolved should be recorded and tracked. I need to point out here that these exchanges cannot be purely democratic; one voice does not and cannot equal one vote. The Signal Battalion Commander must be in charge and it needs to be recognized that he will have to make tough and in some cases unpopular decisions. The important thing is that everything is critically examined from more than one viewpoint and that there exists a spirit of cooperation.

The next step is a series of signal battalion FTXs, probably a minimum of two, three if time and funds will permit. Ideally arrangements should be made to allow brigade signal elements and equipment to participate in these exercises. Obviously, the objective of these exercises is to

debug the system as much as possible. The final step would be an exercise, preferably an FTX, with the division.

After all of the hard work and planning it would be nice if the division exercise went off without a hitch. However, this will be the first time that the system is actually tested under load. Signal battalion soldiers will not yet be completely comfortable with the system. More importantly, perhaps, division soldiers and leaders will not be comfortable. Thus, even if nothing goes wrong, which is virtually impossible, the perception of the division may be that things could have gone a little smoother. It is important, therefore the key players in the division be properly conditioned on what to expect from this first exercise. Beyond that I would ensure that signal battalion leaders are constantly visible at key command posts throughout the exercise. These individuals should be prepared to instruct and assist division personnel on the new system. If everything is handled properly the division should come away from the exercise feeling enthusiastic about the potential of the system, if not entirely comfortable with it yet.

## CONCLUSION

MSE, when it gets here, will revolutionize tactical communications at Corps and division. The revolution will be both technical and operational. The transition will be difficult because the system represents an entirely new way of doing business. Nonetheless, there are things that divisional signal battalions can be doing now, within current personnel and equipment constraints, which will prepare their soldiers and their divisions to more easily transition to MSE.

MSE will provide dramatic improvements in terms of mobility, stability, reduction of electronic signatures and elimination of corps interface problems. In all areas except corps interface the system described above will also provide improvement. More importantly perhaps, the operational concepts between MSE and the above system are the same. Since the operational concept changes will, in my view, be the most difficult hurdle of all to overcome it seems only prudent that signal battalion commanders do what they can now to overcome it. I submit that changing to a system such as the one described above will pay tremendous



dividends. It will improve support currently being provided to divisions as well as easing the transition to MSE.

## MOBILE SUBSCRIBER EQUIPMENT (MSE)

A. DESCRIPTION. MSE is a subsystem that integrates the functions of circuit switching, radio transmission, communications security, radio-wire integration, and systems control into one composite subsystem on an automatic basis. The MSE will be the primary means for furnishing command post to command post communications as well as mobile radiotelephone service for selected high priority users within the division area of operation from brigade to division rear. The MSE will replace a major portion of the line-of-sight (LOS) multichannel equipment and is composed of the major elements as follows:

(a) MOBILE SUBSCRIBER TERMINAL (MST). The MST is the users' end instrument for radiotelephone voice service. The MST will be designed to accomodate voice, teletype, facsimile, or data traffic. The MST will be operated similar to a push-button telephone instrument with selectable levels of precedence. The telephone instrument portion of the MST is to be capable of remoting from the radio by use of a thin wire or cable. The MST can be operated from a track vehicle, wheeled vehicle or from a CP assemblage and will be typically allocated to commanders and their staff elements.

Inclosure 1

(b) MOBILE SUBSCRIBER CENTRAL (MSC). The MSCs will serve as the MSE system nodes for switching, radio relay, call service assistance and technical control. The MSC will interface with both terrestrial and tactical satellite multichannel, and external cable connections. MSCs will be deployed on prominent terrain features for radio coverage of the area from division rear forward to the maneuver battalion command posts. It is currently believed a 6-person crew will be necessary for 24-hour operation.

(c) ACCESS UNIT (AU). AUs will be mounted in shelters with command post telephone switchboards. The AU will provide the capability for calls from telephone instruments to MSTs and to other users with telephone instruments through AUs at the distant switchboards. Calls to telephones off distant switchboards or to MSTs will be switched and relayed through MSCs if direct links are not possible because of range limitations. A fully automatic call set-up capability is required when the AU is used with the automatic digit switchboard, SB-3865 and the TTC-42. When the AU is used with an analog switchboard, manual intervention by an operator may be required. AUs will be placed with telephone switchboards at division command posts as well as with direct and general support field artillery battalions.

Inclosure 1

## B. SYSTEM CHARACTERISTICS.

(a) System Deployment. The MSCs will be deployed for radio interconnectivity of the area. Demand assigned multiple access (DAMA) channels will link MSCs to AUs at the command posts and to MSTs at any location within radio range. The DAMA channels will carry the high precedence traffic. Terrestrial multichannel will be installed as time permits to link division main, the division support command, and the division signal center or division rear as applicable to handle the high volume of lower precedence traffic in the rear. Cable connections from division main and the division support command to the nearest MSC will also be established as time permits to enhance the traffic volume capability.

(b) Shared Frequencies. The MSE concept calls for a pool of shared channels to be assigned on a demand assigned multiple access (DAMA) basis using omni-directional antennas. Idle channels will be seized, used for the call duration and released when the call is completed. This technique allows for more efficient use of the frequency spectrum.

(c) COMSEC Security and ECCM. The MSE will have full COMSEC security and ECCM protection.

Inclosure 1

(d) Command Post Movement. The MSE system will enhance communications during command post moves by providing continuous telephone type service to users with MSTs. A significant reduction in command post set-up and tear-down times will result because of the reduction in requirements for wire and cable. The AU allows for fast CP movement and the ability to relocate and establish connectivity with another MSC located in the vicinity of the new area.

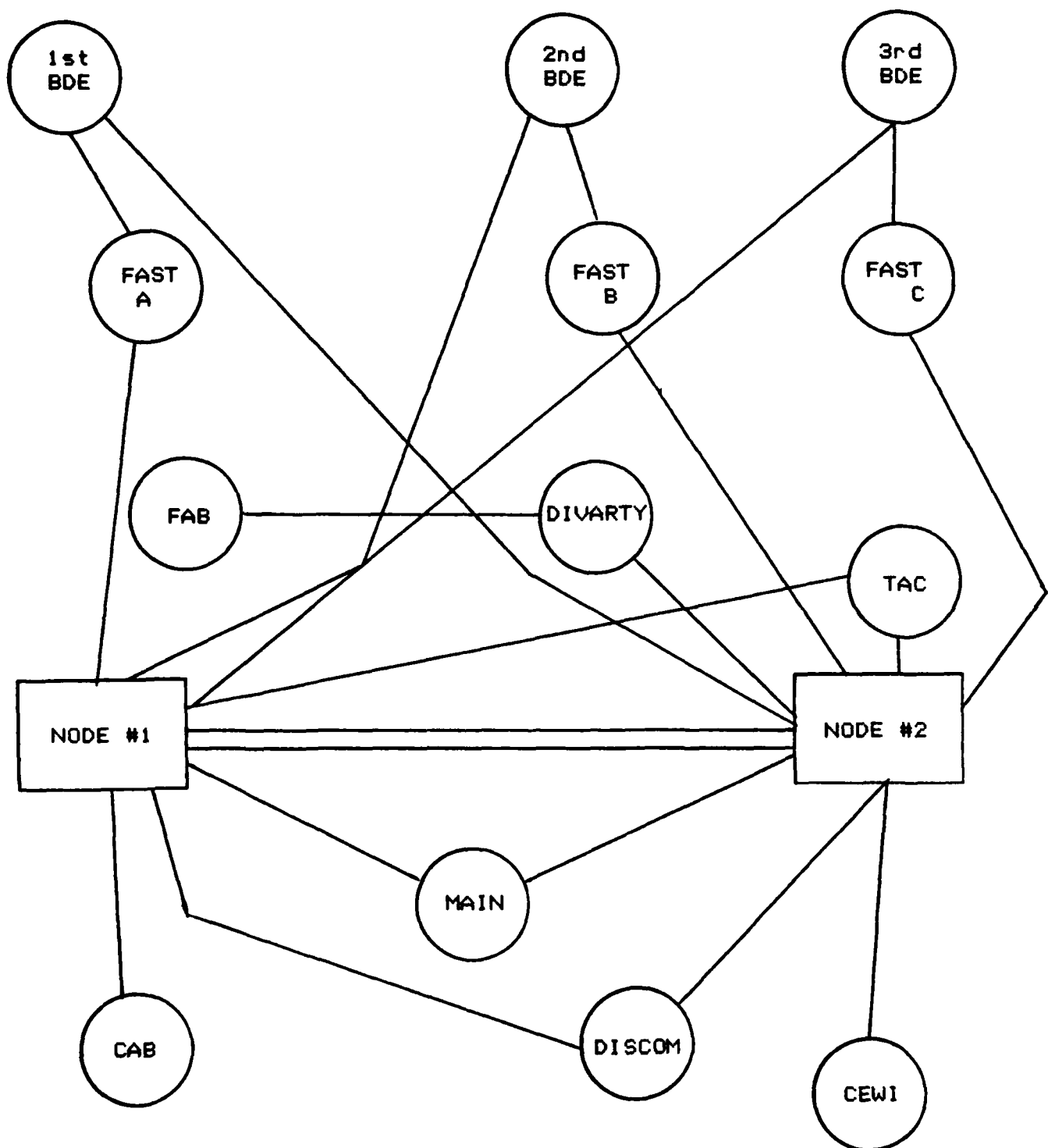
Inclosure 1

MAJOR EQUIPMENT LISTING  
DIVISION SIGNAL BATTALION - EUROPE

TRC-145	PCM TERMINAL	36
TRC-113	PCM RELAY	12
GRC-142	RATT	21
TTC-41	SWITCHBOARD	10
TCC-65	RADIO TERMINAL	4
VRC-49	FM RETRANS	7

Inclosure 2

MULTICHANNEL SYSTEM DIAGRAM



INCLOSURE 3